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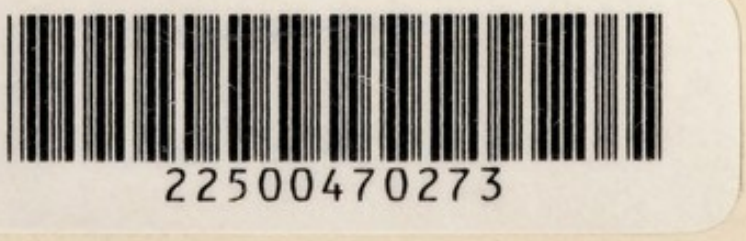

WHY DO WE DIE?

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BY

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PREFACE

THE attitude and the pretensions of the "medicine man" may perhaps have had some value in the days when the multitude was full of superstition and had no scientific knowledge, but we hope those days of ignorance have passed, though we fear superstition remains. The "medicine man" was a more or less clever poseur, who used his small amount of knowledge to conceal his very large amount of ignorance. The medical profession, till the more recent years, cannot be entirely acquitted of the same sort of dishonesty, but a new era of open-mindedness and honesty has, I think, begun.

To get any real success in the treatment of disease, we must get confidences, not

one-sided, but on both sides, between ourselves and our patients, and so alone shall we get that co-operation without which there can be little expectation of success. At present we see this success more in the wonderful results of psycho-therapy than in the treatment of objective disease, but I firmly maintain that mutual trust will prove its great value in this also. Is it reasonable to expect that men of equal learning and intelligence as ourselves will accept our treatment and advice without knowing the rationale of them? Should we do it in the case of legal or religious matters? Our patients know as well as we do that medical knowledge is in a continuous state of flux and that as yet we are nowhere near finality. The dazzling garment of omniscience will be discovered to be the somewhat shop-worn cloak of ignorance. A wise and observant patient can help us enormously in the investigation of

a difficult problem in disease, for the subjective symptoms are often as important as the objective. What the eye does not see may be there all the time.

The history of the world right up to the present time has shown the futility of dividuality as against individuality both in politics and religion. The greater part of our Christian teaching is against separateness, and towards mutual love, consideration, and help. For this reason I have tried to write so that all may grasp the hope and possibility of a longer and more effectual life. Co-operation is the watchword of the future, isolation the disease and explanation of the past.

GLOSSARY OF MEDICAL TERMS

THERE are parts of this book that can only be fully grasped by a physician, but I have tried to write it so that any intelligent reader may be able to see not only the drift of the argument, but may be able to make a personal application of it. To this end I am giving a glossary with definitions of the more abstruse scientific words.

Pathological.—The branch of medical science that treats of diseased conditions, their nature and causes.

Ventricle.—The left ventricle is the chief pump of the heart which by its powerful contraction forces the blood forward into the aorta, the first part of the arterial system. It is the initial motor of the circulation.

Systole.—The contraction of the heart that drives the blood onward.

Diastole.—The dilating time of the ventricle in which the blood flows in to fill it for its next contraction.

Sphygmomanometer.—The name of the instrument that measures the blood pressure.

Peripheral.—The parts farthest from the centre.

Tinnitus.—A singing or ringing in the ears.

Hyperpiesis.—Abnormal increase of blood pressure.

Atheroma.—A form of fatty degeneration with hardening of the inner coats of the arteries.

Endocrine.—A name given to certain glands of the body which have no external outlet or secretion (ἔνδον, within, and κρίνω, to separate), such as the thyroid.

Protein.—The entire amount of nitrogenous material in organic substances.

Hypophysis.—The pituitary gland situated at the base of the brain.

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WHY do we die so long before our time? And what do we die of? These are the two most crucial questions, as far as this life is concerned, that affects us all, but which most of us seem content to ignore.

Putting on one side the accidents of life—and among the accidents I include the acute diseases, such as pneumonia, rheumatic fever, and the infectious diseases, which attack from without, and the so far unexplained cancer—we must allow that our lives and our health are to a great extent in our own keeping, and of our own making. Three score years and ten was David's estimate of

the working years of a man's life, but under modern conditions of improved sanitation the term of life should be at least four score years and ten, and this extra 20 per cent. should not be a time of pain and sorrow, but of peace and rest, with still some capacity for work.

Many of us used to be content to answer the first question, "Why do we die?" by saying our time had come. The unreflecting but so-called religious person seemed to think that God had placed a time limit against each individual when he came into the world. This is pure fatalism, and unworthy of the name of reason or of faith in the Divine justice. "Let us eat and drink, for to-morrow we die" is almost the logical position of such minds. We cannot hope to solve individually or in detail the mysteries of life and death, why one is cut off in the full tide of his energy, and another, who seems to be

going out on the ebb, remaineth. But we must put these following questions honestly to ourselves—Are free will, scientific work, knowledge, self-restraint, and self-denial to be so much wasted powder? Are we to work out our destiny, the sport of chance, hopelessly, illogically, without ambition and without a healthy pride in our work? Is the man who spends his life in riotous living, in over-eating and drinking, and in committing every physiological sin that he can think of, to live as long and as healthily as the wise and sober man? Has the great Father of us all given us no motive for life, no work to do for Him or for our brothers?

Must not we, as separate sections of the Divine image and of His all-pervading spiritual force, endeavour with all our strength and knowledge to prolong the life given us to the utmost limit? Surely the fact of our life, the gift of our life,

becomes a great personal responsibility, an acknowledged debt to our Maker that we can only repay by regarding it as a treasure to be daily cared for and cherished. Thus the promotion of health and the prevention of disease must manifestly be our first considerations, for without health our output of work ceases, or becomes both in quantity and character a poor thing.

The despairing cry of "Why was I born?" comes to most of us in the sorrows and tragedies of life, but it is the cry of faithlessness, of relativity, of blindness to the sure, but half-seen purposes of the Absolute God.

That which we in our presumption are pleased to call civilization, should certainly further such aims for health, but the whole story of the world, of past and gone kingdoms, and of our own times also, show that civilization works up to a point of luxury that

defeats and destroys itself. Babylon, Egypt, and Rome all testify to this end. These old civilizations perished, perhaps, more from enervating luxury and dissipation than from violence; though some of them gave way through feebleness, physical and mental, to a stronger, hardier race from without. In our own times there seems to loom the same danger, but the attack comes from another side. We neither eat nor drink to such excess as our forefathers, and we are not grossly luxurious or debauched, but the strain and the competition of life, both in professions and in business, has become so intense that our nervous systems break down long before their time. This produces rather a new type of an old disease. What is this disease but arterio-sclerosis?—a word which means only thickening of the arteries, but which, after fifty, in its far-reaching results destroys life and working capacity

far more than cancer or any other disease. And this disease is, in the great majority of people, the result of the almost incessant nervous strain that seldom allows our hearts and our arteries, and especially the arteries of our brains, to get their proper quota of rest.

Though the average duration of life has increased during the last fifty years, much of this is due to a lower mortality in infancy and childhood. There has been an actual increase in the mortality rate among males between the ages of fifty-five and sixty-five. One-third of the total deaths in this period are due to diseases of the heart and blood vessels. In America it is stated to be 10 per cent. higher. If the causes of death in certificates were given more exactly, this proportion would be without doubt still greater. These deaths cannot be fairly brought under the heading "Old age." This is what we die of! According to

our death certificates we die of paralysis, of strokes, of Bright's disease, of softening of the brain, of cardiac degeneration, of angina pectoris, but in nearly every case the foundation, the *causa causans* is arterial disease.

Sir Clifford Allbutt, in his distinctive way, says :—

"We recognize now, all of us, that, in the lapse of men's years, one long reckoning of his mortality is, and from all known ages has been, written on the walls of his vessels. We may suppose that in the primitive man, by external conditions if not by innate capacity, life was of comparatively brief duration. Domestic animals seem, as a rule, not to live long enough to use up their arteries or not to live ill enough to abuse them, and amongst these creatures atheroma, though not unknown, has not been commonly observed. We may reasonably conjecture that, as in Stable Societies

human life became protracted, the arteries got time to wear out."

There is plenty of evidence from the mummies of Egypt that atheroma and sclerosis were common, not only in advanced age, but in the middle years of life. We cannot know intimately the life that these old people lived, but we can pretty well picture from history both the height of luxury and the nervous strain. Civilization brings without doubt more comfort, more luxury, and more scientific knowledge, but it seldom brings more true personal wisdom. The philosophical calm and contentment with simple pleasures, and wise simplicity of life, are still the exception. To use a slang expression, we are nearly all of us "on the make," stretching forth eager hands and hearts towards the will-o'-the-wisp of wealth and advancement, while we let the real values and beauties of life pass us by and so we continually

miss our markets. The great war has taught us one good lesson, viz., that we can live and be well—nay, better—on much less food and on simpler than was our former custom; but it has increased, at any rate for the present, the struggle for and the pain of mere existence.

We must nevertheless be optimistic, and hope that the great advance in science may soon make life easier, and the food of the world once again sufficient for its inhabitants; then, please God, materialism may shrink into the background and things spiritual come into their own. Not, however, by a reformed and wiser life alone do I hope to show the more excellent way, but to show that modern science has placed in our hands a preventer of decay and a prolonger of life and energy. I cannot promise that this discovery will take twenty years off a woman's life and put

twenty years on to her beauty, but I know that it will give many more years of fruitful and enjoyable work, with greater strength and better health.

CHAPTER II

ARTERIO-SCLEROSIS: ITS NATURE AND ITS CAUSES

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THE thickening chiefly of the middle coat of the arteries that we find in this disease is the first pathological sign, and it implies that morbid structural changes have begun; but long before this occurs, the predisposing causes have been at work. The actual structural change is the visible effect of the law that over-use of a muscle produces over-growth or hypertrophy. This is not a law of disease, but of purposeful utility, designed to meet emergencies of life. Still there is a further law in nature, that long-continued excessive use of any muscle leads to a form of hypertrophy

which cannot maintain its vitality, but degenerates. Arteries must be treated as muscles, for their muscular coats contract and dilate, as circumstances demand, under the control of the nervous system.

Dr. George Oliver, in his third edition of *Studies in Blood Pressure*, among his fundamental data lays down this law:

"Though the left ventricle—dispensing its blood under a high pressure into the aorta—is the master hand in maintaining the arterial blood pressure, the height to which that pressure rises depends primarily on the resistance encountered in the peripheral arterial system, and in the capillaries, and, secondly, on the response of the ventricle to overcome that resistance. Given a normal ventricle the arterial tonus largely determines the ventricular response and the level of the arterial blood pressure; and this is the keynote of the physiological

and pathological variations of that pressure."

Arterial tension may be described thus: During the resting-time of the heart, between each beat, the circulation of the blood is maintained by the contractile power of the arteries, which steadily urges the blood onwards into the capillary vessels, and so into the veins. This power is known as arterial tension or pressure, and it is estimated fairly accurately by the sphygmomanometer. A large number of observations have taught us what is the average pressure at different ages of life, and thus we are able to talk about a normal or abnormal pressure.

If we hope to understand and successfully treat abnormal pressure and sclerosis, we must visualize the whole of this picture clearly, wisely, and in its due proportions. This we have not always done. The heart man, as Osler

wittily said, "tinkers at the pump," while the pressure man, with his manometer, concentrates on the pipes. To give a scientific description and explanation of the physics of the circulation is far beyond me, and would be inappropriate in a small practical work of this sort, but a study of some elaborate standard work, such as Sir Clifford Allbutt's *Diseases of the Arteries*, or Halliburton's *Physiology*, would do much to give a fair understanding of this intricate subject: but, as they so often acknowledge, the vital problem of the circulation, with its ever-changing demands, both general and local, can hardly be solved by the known laws of physics. Heat and cold, joy and grief, anger and fear, acting through the nerves of the vaso-motor system, all help to complicate the problem and often to confuse cause and effect.

As far as we can as yet judge, the

first objective symptom that points to threatening sclerosis is a more or less continuous rise of systolic pressure, as measured by the sphygmomanometer (the use of this instrument is imperative). The following extract from the *Lancet* January 8, 1916, puts the matter very clearly: "The clinical value of observations on Blood Pressure is doubted only by those who have never made them. It is true that the finger can detect some difference in pulse tension, but it is often entirely at fault, since it can only estimate total pressure, thus missing a high pressure, if the volume be small. In the same way, although the hand can detect differences of temperature, it cannot replace the thermometer. The sphygmomanometer has enlarged our ideas, cleared up difficulties in diagnosis, and helped in prognosis. This has naturally reacted on treatment; it has enlarged our ideas on 'heart failure.' The heart

is adjusted to work at certain pressures, and though within considerable limits it can adjust itself to variations, those limits may be exceeded."

There are subjective signs, especially in middle age, which point the same way, but we can seldom get hold of patients at this early stage. These are chiefly shortness of breath, on slight exertion, which makes a man realize that he has almost suddenly got out of condition, that the elasticity of youth has gone; a feeling of brain fatigue, quite out of proportion to the work done; sometimes giddiness and tinnitus, especially on stooping. Whether these symptoms appear before there is a rise of pressure it is difficult to say, but they should certainly in all cases suggest blood pressure testing. The key to the patient's future then lies first in our hands, and then in his, life or death, health or disease, a full working life and happiness or

incapacity and failure. The examination must be carefully made and frequently. The best time to take pressure is about two hours after food, when there has been a time of physical quiet, and no hurry or emotion. The position should be either recumbent or sitting in a chair, with the arm resting on a table (the muscles of the arm should not be in action), and the wrist should be on the same level as the heart. Pressure readings are higher when standing than sitting, and when sitting than lying down, the difference being from four to eight millimetres. In the early stages pressure varies a good deal, and will not show a rise at all times of day; in the early morning particularly it is often quite normal.

The question now arises, What is the normal? For our purpose we may leave out the question of pressures in childhood and early life, and may take the following

figures as a fair average for our calculation :—

From 40 years of age to 50, 130 mm. to 135 mm.
50 „ „ 60, 135 mm. to 145 mm.
60 „ „ 70, 140 mm. to 150 mm.

I think there can be no doubt that there is a period, often of months, when there is only increased contraction of the muscular coats of the arteries. This is due to the increased strain of life generally, and is in consonance with our experience generally of muscular overgrowth and overwork. Huchard called this "the pre-sclerotic stage."

I think we may say that any pressures at about fifty years of age below 120 mm. are a sign of debility, and above 150 mm. are signs of threatening arterial trouble. Over sixty there is a natural tendency to hardening of the arteries, and many men seem to lead healthy lives with a pressure of 160 mm. Still, with a pres-

sure of that height they cannot afford to put any excessive strain on their arteries. At about eighty there is a decided tendency for pressure to fall, even if there has been plus pressure before. It is rare to find high pressure over ninety for the reason that people who live to that age must have had healthy hearts and arteries all the time, but even in them we not infrequently find passing rises; these are often missed, but they cause much mental distress and even delusions, but at this age, under treatment, the pressure soon falls and the mind clears. I had one lady who lived to ninety-seven, and during the last six years of her life she had visions and slight delusions when her pressure rose, but in the intervals her mind was quite clear. She learned to recognize the cause of her trouble.

This rule of normality stands pretty true for the majority of people, but in

practice we find a good many individual exceptions: in such, the personal equation has to be solved. Women often, even in advanced age, have very low pressures, even 120 mm. to 125 mm., and seem to carry on quite well. They again get a period of high pressure about the climacteric, which with careful treatment disappears, and their subsequent years from about fifty-five to seventy-five are often the best and the happiest working years of their lives. It is not uncommon both in men and women who have led strenuous but healthy lives to find, about sixty, steady pressures of 160 mm. to 170 mm., without causing any symptoms of illness or distress. These people, though one cannot consider them safe lives from the insurance point of view, have learned to manage themselves and seem to have set up a new, personal normal which is an effective compromise. If one has been able by careful observation to satisfy

oneself about such a case, it would certainly be unwise to try to lower that pressure point. Even in cases where there is manifest disease of some standing, one has to find out the best working point of pressure for the individual. They can live and work fairly comfortably at 160 mm. or 170 mm., but if you lower the pressure to 140 mm. or 150 mm., their hearts get irregular and they feel good for nothing; but I think we may make a working rule that a pressure of 180 mm. and over should be lowered; the danger to the cerebral arteries is too great. Even in the early stages a careful watch should be kept on the kidneys. If albumen appears, it makes the prognosis more grave, but it should cause no despair. Mahomed and the early observers thought that kidney disease was almost inevitable sooner or later, but further experience has shown us that many cases live for years and then die

without albuminuria. In other cases it is often transient and responds to treatment.

Hitherto I have only dealt with systolic pressure, but the diastolic pressure in senility and sclerosis is a matter of much importance, and helps us both in treatment and prognosis. Brunton said: "The systolic pressure shows the maximum height to which blood pressure is raised by the wave of blood driven into the aorta by the contraction of the left ventricle. It thus indicates in a general way the strength of the ventricle. The diastolic pressure shows the minimum to which the blood pressure sinks during the interval when no blood is coming into the aorta from the heart, and the arterial system is emptying itself through the capillaries into the veins. It therefore indicates generally the degree of contraction or relaxation of the capillaries."

For practical purposes we want to know the pulse pressure, and this is roughly estimated by subtracting the diastolic from the systolic. A systolic pressure of 140 and a diastolic of 100 would give a pulse pressure of 40, which is about right. Any pulse pressure of over 40 points to hyper-tension, and under 20 to hypo-tension. The diastolic pressure is more constant than systolic pressure, and is not so susceptible to disturbing external influences ; it is therefore a surer guide in estimating hyper-tension. A continuous diastolic pressure of over 100 certainly points to continuous hyper-tension. If the difference between the systolic and the diastolic is normal, about 30 to 40, we may conclude that the heart's impulse is normal, and that even in conditions of marked sclerosis there is efficient compensation.

Sir Clifford Allbutt says (in *Diseases of the Arteries*, vol. i, p. 92) : "It is in

the experience of us all that, as the walls of the great vessels lose their elasticity, the systolic pressure mounts above its proportion to the diastolic which falls. In aortic regurgitation the difference between the systolic and diastolic figures may be enormous, as much as 105 mm. to 210 mm. In a certain 'Adams Stokes' case of my own, at a pulse rate of 32, the systolic pressure was 180, the diastolic 90 mm. Thus, with the difference between the two pressures waxing as the resilience wanes, the blood pressure moves more suddenly and largely, bangs more, and thus racks the machinery. The greater vaso-motor lability in youth has a like effect, but the vessels are then much more resilient and energy is stored. In an early hyperpietic, or nephritic subject the systolic exorbitancy may be considerable or variable, while the diastolic is steadily in excess. As age advances the amplitude increases to 80 and upwards;

a systolic pressure of 160 mm. may be associated with a diastolic of 75 mm. or 80 mm."

Dr. H. C. Mann says: "That as compensation fails, the diastolic pressure begins to fall, and the systolic becomes irregular." It must seem very difficult for a beginner, or even for an experienced busy practitioner, to find his way through all these devious by-paths, which must look to him often to be blind alleys and to lead nowhere, but out of the welter a few good and sound working principles emerge.

"*Firstly*, that at middle age and afterwards the knowledge of an habitual systolic pressure is of first-rate importance.

"*Secondly*, that this knowledge can be confirmed and sometimes rectified by knowledge of the diastolic pressure (manifest valvular diseases of the heart, especially aortic regurgitation, are excluded); and that a continuous rise

of systolic and diastolic pressure point conclusively to threatening or confirmed arterio-sclerosis.

"*Thirdly*, that a steady ratio between the two pressures, even when much above normal, is a sign that the heart is doing its work well; and conversely, a falling diastolic ratio is a sign of failing compensation."

Dr. Louis M. Warfield, in his work on Arterio-Sclerosis, says: "It is most important to estimate accurately the diastolic pressure as well as the systolic, for only in this way can we obtain any data of value regarding the driving power of the heart and the condition of the vasomotor. A high systolic pressure does not necessarily mean that a great deal of blood is forced into the capillaries. Actually it may mean that very little blood enters the periphery. The heart wastes its strength in dilating constricted vessels without carrying on the circulation

adequately. The pulse pressure is the difference between the systolic and diastolic pressure, and practically represents the heart lode."

All these considerations demonstrate the importance of watching closely the pump as well as the pipes.

In the above figures I am presuming that the auscultatory method of determining pressure has been used. It must also be manifest that, the earlier treatment begins, the more sure will be the success. It may be that all our theories will meet the ultimate fate of so many others and be abandoned, or partially disproved, but the practical therapeutic results will remain—an increased capacity for work and considerable prolongation of the later years of life.

For a short and graphic description of the two methods of estimating pressures I am poaching from an excellent book called *Blood-pressure Technique*

Simplified, by Dr. W. H. Cowing, of America (pp. 12–15):—

"There are two methods of determining blood pressure, that by oscillation, and that by auscultation.

"We will first describe the method by oscillation.

"Place the bag over the arm with the two tubes well under the arm and over the brachial artery. Wrap the remainder of the sleeve around the arm much the same as you would apply a bandage, tucking at least six inches of the sleeve under the last fold. Then place the sphygmomanometer in one tube and the bulb in another, and you are ready for reading. Care should be taken not to put the sleeve on tight enough to cause any apprehensive feeling in the patient.

"Place the finger lightly over the radial artery and send the pressure in the cuff to the point where the pulse has entirely

disappeared, then advance the hand about 2 cm. above this point of disappearance, then release the air gradually and note the first perceptible pulse wave felt by the palpating finger at the wrist. This represents the true systolic or maximal pressure.

"Having now obtained the systolic or maximal pressure, release the air gradually by means of the escapement valve, and note where the largest oscillation or movement of the hand takes place, and the lowest point of this largest oscillation is the diastolic or minimal pressure.

"For example, if the largest oscillation occurred between the divisions 90 to 96, 90, being the lowest, would be the reading.

"It is well to bear in mind to keep the eye concentrated on the scale divisions, for the travel of the hand can be accurately determined when this is done.

"In determining systolic (maximal) pressure, the pulse becomes more feeble

as the pressure advances, and when taken with the ends of the fingers, the pressure of the fingers is involuntarily increased, so that a very sensitive pulse may be closed off entirely by the finger pressure; while, if taken with the ends of the fingers resting on the upper curve of the bone of the wrist, permitting the balls of the fingers to rest lightly over the radial, thus bringing in contact with the pulse the most sensitive part of the fingers, any extra pressure that might result would be directed against the bone and not the pulse.

"*Method by Auscultation.*—This is by far the most accurate method of determining the blood-pressure, and the results obtained in this way should be free from error, or the dangers of personal equation in palpating the artery at the wrist.

"*Systolic or Maximal Pressure.*—Bare the arm and adjust the sleeve well up;

place the stethoscope over the brachial artery about 1 cm. below the border of the cuff, then constrict the arm by inflating the bag until no sound is heard in the artery through the stethoscope. At this point release the air slowly by means of the escapement valve, and soon a clear, clicking sound will be heard, which indicates the first passage of the blood stream below the constricting arm band and is the true systolic or maximal pressure.

"*Diastolic or Minimal Pressure.*—Still gradually releasing the air, this clear, clicking tone (first phase) is followed by a low tone or murmur (second phase), and this murmur is followed by a loud, clear tone (third phase), this in turn by a perceptibly dull tone (fourth phase), and this dull tone represents the diastolic or minimal pressure.

"Below are given the five different phases of tone to be heard in the auscul-

tatory blood-pressure phenomena as found by Louis M. Warfield, A.B., M.D., and confirmed by his clinical observations on animals.

"The first phase is due to the sudden expansion of the collapsed portion of the artery below the cuff and to the rapidity of the blood flow. This causes the first sharp clicking sound which measures the systolic pressure.

"The second, or murmur and sound phase is due to the whorls in the blood stream, as the pressure is further released and the part of the artery below the cuff begins to fill with blood.

"The third tone phase is due to the greater expansion of the artery and to the lowered velocity in the artery. A loud tone may be produced by a stiff artery and a slow stream or by an elastic artery and a rapid stream. This tone is clear cut, and in general is louder than the first phase.

"The fourth phase is a transition from the third, and becomes duller in sound as the artery approaches the normal size.

"The fifth phase, no-sound phase, occurs when the pressure in the cuff exerts no compression on the artery and the vessel is full throughout its length."

He also says that blood pressure always depends on four factors, viz.:

1. Cardiac energy.
2. Peripheral resistance.
3. Elasticity of the arterial walls.
4. The amount of blood in circulation.

It is very important to remember these and to give due value to each of them. With regard to No. 4, it is doubtful if this is of as much importance as has been thought or as one would at first think; the mass of blood in the body has such a large reserve of stowage room in the muscles and in the internal viscera,

that its effect on general arterial pressure must be slight. The viscosity of this fluid is probably of far more importance. If one bleeds a case of high pressure freely, the pressure will fall, but only for a short time; the blood is thinned, but the loss in mass is quickly restored by absorption from the watery tissues of the body, and in a very few days the viscosity returns to its former point. Bleeding is thus very good for emergencies, such as threatening apoplexy or cardiac dyspnœa, but is of little permanent use in the routine treatment of high pressure.

Sir Clifford Allbutt, wisely and correctly, I think, divides most examples of abnormal high pressure into hyperpiesis, which describes this symptom alone, and into senile atheroma. Clinically this is important, for hyperpiesis, which generally comes on about fifty to sixty, is a very serious disease, which, untreated, destroys life in a few years, whereas senile atheroma

may go on till advanced old age, crippling energy perhaps, but in many cases hardly shortening life at all. The former generally ends in cerebral hæmorrhage, cardiac degeneration or Bright's disease, but senile atheroma may escape all of these. In hyperpiesis raised pressure is continuous and tends steadily to increase; in atheroma there are times of high pressure, but as the disease advances the pressure is often normal or subnormal, its gravity depending much on the seat of the atheroma.

Are we justified in regarding arteriosclerosis as a true disease? I think not. One cannot justly compare it with entity diseases, such as the acute infections, as cancer, as tuberculosis, or the diseases that affect the brain and the spinal cord. It is, I think, one of the penalties of an artificial over-civilization, of social, business and competitive pressure, unwise in quantity and unscientific in method.

Unfitted, as yet, in development, and lacking the necessary knowledge, men strive after a higher stage of evolution, or after illusions which they think to be so. For a while they seem to succeed, but involution and premature degeneration are the inevitable consequences. To attain their "ambitious" ends they live and work intensely, stoking their furnaces with far too much food, alcohol and other unnatural stimulants. Intemperate in work, intemperate in living, prodigal in waste, they come to an untimely end.

Such is the description of one type of case that we often meet, but there is another and a sadder class, where unfavourable circumstances through the greater part of life, pressure of poverty and ceaseless anxiety for others, produce a careworn existence, with no joy or colour in it, and often insomnia. Such as these, in spite of a sober, abstemious life, often get sclerosis. Their pulses are

small and thready, but hard, and often deceive the finger. Paralysis from small cerebral hæmorrhage is the frequent end. We may take it as an axiom that happiness lowers pressure, while grief and care raise it. We must all of us feel this as a personal truth, though we may not be able to test it with a manometer. It is not only the cat that care kills. In melancholia the pressure is almost always well above normal; in maniacal conditions generally below.

Few of us know how to work with our brains; psychology has as yet taught us but little of method and of practical value, though for this we must blame ourselves rather than the psychologists. We drive our conscious minds with few or no intervals of rest till brain exhaustion comes; then the machinery gets out of control and the screw races; so come insomnia and poor, confused results, with disappointment and depression. We talk

glibly about the sub-conscious mind, and are now and again struck with some evidence of its working existence, but we few of us use it systematically as our servant—the most competent servant that exists, and one that never gives notice as long as life lasts. Our upper story, in which we suppose our conscious-thought machine works, is like a loft full of noisy machinery that often needs oiling and that often gets out of order. Its physical motor power gets slack or runs right down, and the output is poor or ceases. Sleep and rest alone will restore it and set it going again.

Our sub-conscious mind seems to be almost independent of our physical life; it works more or less continuously while the conscious mind is working, fooling or sleeping. To continue the loft simile: beneath the machine loft, with its clatter and dust, is a quiet darkened room, in which our sub-conscious mind lives

and functions in its own quiet way. Men who know how to use it say that, when their conscious minds become exhausted and have come to an impasse, all they have to do is to open the trap-door and pass the apparently insoluble problem down into the quiet room below. They then banish the subject from their minds completely, rest, play, or take up some other line of thought, and by and by, in a day or two perhaps, when they are not thinking of it, the problem turns up solved. There is no sense of fatigue or of conscious effort in this process: it is just the old adage of sleeping over a difficulty. Many of the world's great inventors have, knowingly or sometimes unknowingly, made their great discoveries in this way. Our conscious minds are limited in motive power and always subject to fatigue, but our sub-conscious minds rarely tire and are unlimited in scope and power, for they

are a part of our Divine inheritance, a portion of the great undivided spiritual force that moves and governs the universe, that slumbers not nor sleeps. To get into close touch with this power needs persevering practice, but it is clearly of inestimable value. We must not expect a clear and useful response unless we have given concentrated attention to the matter in point; a mass of ill-digested, uncertain data will remain as such; we must be perfectly honest with our *alter ego;* it is of no use trying to take him in. The more often and thoroughly we accustom what we call ourselves and our sub-conscious minds to work together in a friendly way, the better and the quicker will be the response.

The above is only a cursory sketch of a profound subject, but will serve to show what great economies can be made in the working of our limited human understandings.

The condition of our arteries that we call sclerosis is much more common in the sedentary brain-worker than it is in the outdoor man. We see it rarely in the farmer, the sailor, the labourer, unless it is as the result of habitual intemperance; we see it rarely in the athlete. The average blood-pressure of the indoor worker is certainly higher than that of the open-air worker, even in perfect health.

It follows, therefore, that the more we systematize and economize in our brain work, the less the strain on the arteries that supply that organ with its life-blood. Few of us realize what can be done in this direction. A much advertised system, which I need not further particularize, has got hold of some of the right ideas and methods, and its teaching will have a big effect in many directions. It is no new system; like almost all wisdom, it comes from the East. The

old Hindu and Persian philosophers knew and practised it thousands of years ago, and got results which we have not approached as yet. The foundation is concentrated attention: we talk about giving attention to a thing, but we most of us do it in a very perfunctory, superficial way. Kipling's *Kim*, which is full of old, out-of-the-way, unsuspected philosophy, gives us a wonderful picture of concentrated attention in the contest of observation and memory between Kim and the native boy in Lurgan Sahib's shop. We talk admiringly of a man with "singleness of purpose," but what is that but concentrated attention? We admire him because he achieves his object, he gets there, while the ordinary man with half-a-dozen half-concentrated purposes wanders down all sorts of side ways and seldom arrives anywhere. In this world of keen competition and of little leisure, waste of brain-power leads in-

evitably towards disease and failure, while economy leads to health and attainment.

Beyond the question of the nature of our mental work lies the thing worked for—the object: the importance of this from the health and disease standpoint is very great. If the object is a worthy one, something of use, something elevating, not only for ourselves but for others, attainment will bring happiness and peace, and so tend towards a healthy condition of brain. If, on the other hand, we strive for an ignoble, selfish object, one that is almost certain to harm others, attainment will be like Dead Sea fruit in our mouths, dry and unsatisfying; there will be in us no sense of joy, and the injury we have done to others will recoil on ourselves, bringing disappointment and sorrow. These are they who walk in slippery places, while the unthinking world, seeing not their end, regards them with envy.

By learning to use our minds wisely, intelligently and economically, we shall accomplish far more and with far less expenditure of force; we shall grow in the true philosophical love of a high and simple life. The false aims, the conflicts, the disharmonies of this world will pass us by and leave us at peace.

Arterio-sclerosis, then, except in the sad cases of heredity, is very much of our own making; it almost comes under the heading of "an occupation disease"; it is a natural result of non-natural conditions of life. In the words of Isaiah: "Wherefore do ye spend money for that which is not bread, and your labour for that which satisfieth not?"

Writers have for descriptive purposes, and in most cases rightly, divided arterio-sclerosis into the two main types that I have described on p. 50—the hyper-piesis type and the atheromatous; but in general everyday practice we shall

often come across cases that fall under neither head. Raised blood pressure, even to a considerable degree, 170 mm. to 180 mm., is frequently a temporary affair only, brought about by temporary causes, such as grief, anger, excitement or injudicious feeding. An altered mental outlook or a dose of calomel may banish it quickly; these cases are functional only. The wiser ones get to recognize their symptoms and the causes: these symptoms are chiefly a worried state of mind, irritability about little things, a sense of brain hurry, without the power to accomplish, and there may be passing vertigo and tinnitus. Such is the day of small things which should never be ignored, for the day of small errors unheeded may pass on into the long night of disease.

CHAPTER III

THE WAY OF SAFETY

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THE pre-sclerotic state of raised pressure may last a considerable time —two or three years—but this can never be relied upon ; every attack means extra work for the heart, and uses up for a time the reserve power of that long-suffering organ. Some hearts will respond well to the call for many years, but others give out and dilate. Continued raised pressure means one of two things —increased resistance and partial obstruction in the small arteries and capillaries, or increased ventricular action and force. An example of the first, which is far the more common, is seen in sclerosis; of the second, in aortic regurgitation. In the

one case the heart is overcoming resistance—in the other, compensating for a leak. In the first, the error or departure from the normal is in the pipes—in the second, in the pump; but as both are vital organs and not mere bits of mechanism, they in time react on each other and both become altered. This change is, if vitality be strong, in the direction of conservatism, of accommodation to the new order of things. It is compromise, which may be effectual for a long time, but which, like most compromises, comes to failure in the end. Occasionally we find the sclerosis attacking the heart-muscle itself or its arteries; such cases are obviously more serious. This condition generally comes on more or less at the end of the disease, but in a few cases quite early. Probably many of the cases of true angina pectoris occurring in early middle life are of this nature, the coronaries being the chief point of attack.

Besides excess of work and unwise work there is another cause which seems to raise pressure, and that is absorption of ptomaines or of the products of imperfect digestion; the overstrain cause and the absorption cause very often act concurrently, for imperfect assimilation is often the result of the unwise life. We see this more often, perhaps, where the unwise life is accompanied by overeating and injudicious alcoholic stimulation, even if this is not very excessive: such people rarely give themselves time to digest. The supply of nerve energy that is necessary for perfect digestion is turned off at the main long before its proper time. We doctors have a first-hand personal knowledge of this cause, for owing partly to the intensive nature of our work and partly to the exigeant importunity of our patients, we more often practise the vices we deplore than the virtues we praise; this is one of the reasons

that our profession is the shortest-lived of all.

It is not quite clear how this absorption causes hypertension, but it is probably through an effect on endocrine glands, chiefly perhaps on the suprarenal and secondly on the thyroid. McGarrison has shown how often Graves' disease is caused by faulty intestinal digestion, and by the colitis that ensues; this he thinks stimulates the thyroid to overactivity or to faulty secretion. The suprarenals are probably affected still more than the thyroid, and the hyperthyroidism may be due to the upset of the balance of power; for these two glands through the sympathetic act and react on one another. It is fairly established that in some cases of Graves' disease we get hypertension and in some hypotension, though both conditions vary a good deal. It may be that the hypotension cases are those that are accompanied by suprarenal deficiency

and that benefit by suprarenal treatment, and I believe it to be so. This would explain the conflicting opinions as to the value of this treatment. It has certainly succeeded admirably in some cases.

The co-ordination of all endocrine actions is so intricate that we can only puzzle out the way by careful clinical observation and experiment. In sclerosis, as a rule, we get evidence of hyperadrenalism and more certainly of hypothyroidism. Victor Horsley considered premature senility to be a form of myxœdema, which of course means pronounced hypothyroidism.

Biedl says: "A special pathogenetic significance is ascribed to thyroid insuffiency in the changes which occur in later life, and which are included in the term 'cachexia of old age,' or senile degeneration. The foundation for the theory that old age results from the changes in the thyroid gland lies in the fact that in old

age the thyroid becomes atrophied, its follicles shrink, and retrogressive changes take place in the epithelial cells. This is reinforced by the fact that there is a profound analogy between the signs of advanced old age and myxœdema. The falling of the hair and the dropping out of the teeth, the dry and wrinkled skin, the lowered temperature, the diminished perspiration, the indolent digestion and consequent emaciation, the decrease of mental power and the diminution of the activity of the entire nervous system—these are all symptoms that characterize chronic myxœdema."

From the old partially true adage, that a man is as old as his arteries, we must go a step further back and say that a man is as old as his thyroid. This statement is probably not a final one, but it gives us a very valuable pointer in the way of treatment. Arterio-sclerosis and arterial degeneration are the almost universal

accompaniments of thyroid deficiency, and are in most cases the result of that condition.

There is no main or royal road to the successful management of sclerosis ; every little cause must be thought out and righted if possible, but as a foundation nothing is so important, I think, as a clean, healthy intestine, which hitherto has been much neglected. A microscopical examination of the fæces will often show what is wrong, and also the direction and results of treatment.

If the condition is thoroughly bad I begin with this rather drastic regime—twenty-four hours' absolute starvation in bed, a tenth of a grain of calomel every hour for twelve hours and as much hot water as the patient can comfortably drink. This has a wonderful effect, and one's subjective feelings after it tell us that evil has gone out of us and that good has taken its place.

The treatment by bowel antiseptics has been generally very unsatisfactory. Beta naphthol helps, perhaps, but the most good comes from duodenal extract in some form. Two grains of the dried powder about two hours after each meal in pill or tablet act well. Carnrick's Secretogen tablets and the much-advertized Jubol are good, and both depend on some extract from the duodenal mucosa. The unpleasant flatulence and the fermentation in the bowel soon disappear, and with them the mucus that is often shed from the coats of the colon. Better assimilation of food goes hand-in-hand with improved health and vigour. Intestinal dyspepsia is more far-reaching in its effects than gastric dyspepsia, but is often ignored.

The questions of food and cooking need most careful consideration. In the affairs of the soul Christ taught "that which cometh out of the man, that defileth

the man"; in the affairs of the body, that which goeth into a man, that defileth the man. Both teachings are true and both are purposeful exaggerations and in a sense untrue. Out of the same mouth proceed blessings and cursings and into the same mouth go good food and poisons. The sin lies sometimes in the nature, but more often perhaps in the excess. The word "temperance" has been made to apply far too much to the use of alcohol. As a fact, I believe, far more nowadays are intemperate in eating than in drinking. As the tale of our years increases and as our physical life gets less strenuous and active, we require less food, or at any rate a different kind of food; the strong nitrogenous foods, as meat, become less called for, and if taken beyond our needs become poisons. The imperfect products of assimilation have to be dealt with by our excretory organs, which become overworked and unable to meet the demands.

The scavengers cannot clear the dust-heaps. Hence arise kidney disease, faulty liver action, and raised blood pressure. And yet, how many of us seek to restore failing strength by stronger food and more stimulation? In this futility, kind but ignorant friends aid and abet. Think on what a little food a baby lives and grows, and, at the other end of life, on what a simple frugal diet really old people thrive and work.

It is all very well to lay down rules for food, calculated in calories for strong working men and athletes, but in approaching old age every one must become more or less a lawgiver to himself; this especially, if there is any tendency to hyperpiesis, for any food in excess of the body's needs becomes for the time a poison. What we can digest easily and what with difficulty must be largely a personal question, but the direction should certainly be towards a non-meat regime.

The difference of climate makes comparison between the vegetable feeders of the tropics and ourselves of uncertain value, but it is a lesson to see what the Scotch gillie can do on a diet that is mostly oatmeal, milk and cheese. The gluttonous man and the wine bibber seem to get a pleasure out of life that the sober men miss, but we doctors see the other side of the shield, the after-suffering and the failure: the broken law brings its own punishment and there is no escape.

The physiological process of digestion is rather elaborate, and, fortunately for us, somewhat elastic. It is not a question entirely of certain substances in a test-tube exposed to certain digestive agents. This, of course, is the foundation, the basic process, but there is much variation in the nature of the food, in the external conditions of season, of heat and cold, of youth and age, of greater or less physical or mental demands on the food digested,

and lastly on the supplies of saliva, of pepsin, of hydrochloric acid and of duodenal and pancreatic secretions. These are all under the control of the autonomous nervous system, which in the stresses of life often breaks down and fails to function properly. In the full tide of youthful energy our digestions seem to respond effectually to many and unreasonable demands, but this is more apparent than real; the bills may be a long time before they are sent in, but they come. The recuperative power of youth is marvellous, but probably never quite complete. After forty years of age it fails more and more, and then bills come in more quickly, while in old age it becomes almost a question of cash on delivery. Realizing this we should, in our own interests, treat our digestive apparatus with deep respect, and not with the scant courtesy we generally show, for on its faithful working depend our life, our health, our

happiness and our powers of work. The farmer in his feeding of cattle, the head of a racing stable in his feeding and training of horses is far more scientific and wise than we and most other men are in the management of ourselves. This is why we end our days so often prematurely, or in paralysis and pain.

To go into actual details of diet is a thankless task, and not very helpful to the mass of men; it is better, I think, to point out directions only. If there are symptoms of hyperpiesis, the chief object is to arrange a diet that contains a minimum of protein (especially of animal protein) compatible with life and energy. Most of such cases are leading a life of no great physical strain and will do well on a diet calculated in calories, that contains:

Protein	90
Fat	75
Carbohydrate	330=Calories 2,400.

If this is insufficient, add to the fat or carbohydrate rather than to the protein.

The following tables from Dr. Sprigg's excellent work classify the common foods according as their energy production is due to protein, carbohydrate or fat. It will be noticed that milk is the only food in the lists which contains a good proportion of all three. Cheese, Brazil nuts and bread contain a fair proportion of at least two of the requisite food-stuffs.

If we take, for instance, the figures of lean beef in the first and second column, viz. :

Lean beef	..	..	90+10 we get its value
Chicken	..	..	79+21 we get its value
Bread ..	..	..	13+6+81 we get its value
Cheese ..	..	..	25+73+2 we get its value

By roughly arranging foods according to such a table we can arrive approximately at a suitable balance of its various constituents. But the chemical side of the

PERCENTAGE OF TOTAL HEAT VALUE OF FOOD FURNISHED BY ITS

PROTEIN	Per cent.	FAT	Per cent.	CARBOHYDRATE	Per cent.
Lean beef (boiled)	90	Butter	99	Tapioca (cooked)	98
Chicken	79	Bacon	94	Prunes (dried)	97
Mackerel	50	Cream	87	Figs (dried)	95
Skim Milk	37	Brazil Nuts	86	Rice (boiled)	89
Eggs	32	Fat Ham	81	Oysters	89
Beef with fat	25	Fat Beef	75	Potatoes (boiled)	88
Cheese	25	Cheese	73	Bread	81
Fat Ham	19	Eggs	68	Peas	72
Milk	19	Boiled Mutton	65	Milk	29
Bread	13	Milk	52	Cream	8
Potatoes	11	Mackerel	50	Brazil Nuts	4
Boiled Rice	10	Chicken	21	Cheese	2
Brazil Nuts	10	Boiled lean Beef	10		
Bacon	6	Bread	6		
Cream	5	Bananas	5		
Bananas	5	Potatoes	1		
Butter	5				

problem is not the only one to study. Idiosyncrasy, appetite for certain foods, distaste for others, and personal experience must all receive due consideration. The appetite for certain foods varies much at different periods of life. Fat is abhorrent to many children, and their lives and digestions are much troubled by the parental, but unscientific order to "clear up their plates." In later years the same persons will welcome fat and need it. Sugar again is loved by children, scorned in middle age, when its place is often supplied by wine or beer, and is again welcomed and of great value in old age, for it helps much to maintain the failing heat of the body, to keep the home fires burning. Good cane-sugar at all stages of life seems to act as a special food, or at any rate stimulant, to the heart muscle; given in large quantities it often gives a failing heart a new lease of life. The digestibility of food is not

governed entirely by its chemical composition. Twice cooked meat must contain nearly as much potential nourishment as once cooked, but experience tells most of us that we digest it with difficulty; and if the digestion of a food is not perfect, there is more unwholesome waste product to be cleared away; there is impure blood circulating in all our organs, but we feel it perhaps more in our brains; the lethargy, the depression, the irritability that we all recognize as the accompaniments of indigestion, all stand as cause and effect. Again hot fat and cold fat must contain the same constituents, but many can do well with cold fat, while they get bilious with the other. The same thing applies to butter. All these things we must honestly observe, each man for himself, and we must not let our likes and our appetites, nor our prejudices, sway the conclusions of personal experience and scientific knowledge.

Dr. Haig has shown us how many of our ailments are connected with excess of uric acid in the blood, and how much this excess is due to certain foods such as meat, which contains what Fischer named purine bodies. The following extract from Halliburton's *Handbook of Physiology* will partially explain this subject:

Origin of Uric Acid. — Uric acid is not made by the kidneys; when these organs are removed, uric acid continues to be formed, and accumulates in the organs, especially in the liver and spleen. After extirpation of the liver in birds (in which animals uric acid is such an important katabolite) the formation of uric acid practically ceases, and its place is taken by ammonia and lactic acid, and the conclusion is therefore drawn that in these animals ammonia and lactic acid are normally synthesized in the liver to form uric acid. But in mammals this

is not the history of uric acid formation; in these animals, including man, uric acid is the end-product of the metabolism of nuclein, from the bases of which it arises by oxidization. Nuclein, the main constituent of the nuclei of cells, yields on decomposition certain products called purine substances, and their close relationship to uric acid is shown by their formulæ:

PURINE BASES.

Purine	$C_5 H_4 N_4$
Hypoxanthine (monoxypurine)	$C_5 H_4 N_4 O$
Xanthine (dioxypurine) ..	$C_5 H_4 N_4 O_2$
Adenine (amino-purine) ..	$C_5 H_3 N_4 N H_2$
Guanine (amino-oxypurine) ..	$C_5 H_3 N_4 O N H_2$
Uric acid (trioxypurine) ..	$C_5 H_4 N_4 O_3$

"Just as the ordinary protein metabolism is both exogenous and endogenous, so is it the case with nuclein metabolism. There are certain kinds of food (such as liver and sweetbread) which are rich in nuclei, and others, such as meat, which

are rich in purine bases (especially hypoxanthine). The increase in uric acid excretion after partaking of such food is exogenous, and those liable to uric acid disorders should avoid such articles of diet. Other forms of diet lead to an increase of uric acid formation by increasing the number of leucocytes in the blood, and there is a consequent increase in the metabolism of their nuclei. Increase in leucocytes may, however, be present independently of diet, and in the disease known as leucocythæmia this occurs to a marked degree; in such cases uric acid formation increases. Although special attention has been directed to the nuclei of leucocytes, because these can be readily examined during life, it must be remembered that the nuclein metabolism of all cells may contribute to uric acid formation. Uric acid, which originates by metabolism, is spoken of as endogenous."

These purine bodies taken in excess, it is almost certain, tend to raise blood-pressure and to favour the production of gout and arterio-sclerosis. Much can be done, when these threaten, by reducing the amount of these in our food. There is, except in very extreme cases, no need for an absolute purine-free diet, but the diet should be in that direction and so towards a sensible, liberal vegetarianism. The following table of ordinary foods, showing the purine contents in grains per pound, pint or teacup, is from the *Lancet*, 1906, vol. ii, p. 933, Potts :

Sweetbread	70·43	Halibut	7·14
Liver	19·26	Plaice	5·56
Beef Steak	14·45	Cod	4·07
Salmon	9·13	Beans	4·16
Chicken	9·06	Lentils	4·16
Loin of Pork	8·48	Oatmeal	3·45
Veal	8·13	Coffee	1·70
Ham	8·08	Ceylon Tea	1·21
Mutton	6·75	China Tea	0·75

In sclerosis perhaps the chief thing is

to avoid the flesh extracts, such as beef-tea, strong meat soups, and rich gravies; for this reason boiled or stewed meats are better than fried or roast. This applies to fish and chicken also; a plain grill is good, but the frying-pan is a danger. Vegetable soups made with bone stock may be taken. Cheese, eggs and milk should supply the greater part of the nitrogenous or protein food. The better sorts of vegetable foods, such as oatmeal, lentils, peas and nuts, will all help to take the place of albuminous animal foods. A certain amount of fat should be taken. A fish and chicken diet contains too little fat and should be perfected by bacon, hot or cold. All the farinaceous foods are good, but the more starchy ones, such as sago, rice and cornflour, are with some people more liable to cause fermentative dyspepsia.

As age advances and our teeth fail in

power we are apt to slip into the way of eating chiefly soft, well-cooked foods, in which what are known as vitamines are almost destroyed, but they are as essential as ever, and some uncooked fruit, salads and unboiled milk should enter into our diet.

When one thinks over the luxurious habits of our predecessors, the enormous amount of food, in excess of body needs, taken at big dinners, one must realize how we and they sinned against the light. The great war has taught most of us, with the exception perhaps of the new rich, how little we can live on and work on with complete efficiency. Economy of food, simplicity of life, mean economy of waste and of expenditure of vital force, and our bitter war experiences should prove to be the path to longer lives, and to lives with a higher standard and greater results.

The question of alcohol in sclerosis is

difficult, but very important. In the first place it depends somewhat on what a man has been accustomed to take. If he has taken a moderate amount with his food during the greater part of his life it does not always do to stop it. Alcohol is not a pressure raiser, as many think, but rather the reverse, and, if stopped suddenly, the digestive powers may be lessened and the tone of the body depressed. Lauder Brunton says: "All the Alcohols tend to dilate vessels, to diminish blood-pressure, and ultimately to diminish activity of the nervous tissues, although at first sight they may seem to have a stimulant action."

Alcohol contains so little nutritious food (with the exception of the sugars and extractives of wine and beers) that in itself it may be said to give nothing to the body; but there is something a bit beyond this—the bitter of the hop and the

flavour, the bouquet of the grape have a stimulating effect on the nerves of taste and smell, and so produce, with some people, a better flow of saliva and gastric juice. This probably is how wine and beer in moderate quantities help digestion and appetite. There is still further the effect on the general nervous system. Alcohol without doubt enables a man to draw on his reserve of force, though it probably does not increase those reserves. This is, of course, drawing on one's capital, but the ability to do this may be of great use in emergencies, for it can help a man to live over evil times. But it must not be forgotten that such calls, if too large or often repeated, must in the end empty the reservoirs and leave him powerless and defenceless.

This question of alcohol must be regarded by physicians with common sense backed by scientific knowledge. The world is never going to be cured of alcoholic

intemperance by intemperance in language and inaccuracy in thought.

Before I go into the more detailed treatment of sclerosis, I must just touch on the question of tobacco. Nicotine, without doubt, is one of the most powerful raisers of arterial pressure known, but in ordinary smoking very little gets into the system. Tobacco chewing and snuff-taking, both nearly extinct, probably introduce more nicotine into the body. The combustion in cigar smoking is so nearly complete that very little poison remains except on the lips. In ordinary cigarette smoking the combustion is about as complete as in the case of cigars, but, if the smoke is habitually inhaled, the absorption through the bronchial mucous membrane is much greater and, I think, must have an appreciable effect on blood-pressure. As in alcohol, so in tobacco, we must not lose sight of the effect on the general nervous system: on many

people tobacco, in moderation, has a distinctly soothing influence, and so leads to a quietude of mind which compensates for any other small evil effect. Used in excess, it certainly weakens both nerve and will power, and often heart power. The first effect in experimental nicotine poisoning is greatly raised blood pressure, but at the end dangerously low pressure, and so we find that the ultimate effect of excessive smoking is a feeble, low-tension pulse that is often irregular. Oliver found that, in ordinary people who were not excessive smokers, tobacco raised the systolic pressure 10 to 15 mm., but that the diastolic was unaffected; the variations between the two thus becoming abnormal. This effect generally subsides in a quarter of an hour after smoking is finished.

It follows, I think, that a man with sclerosis should think this out for himself, for he is not in a position to take any

unnecessary chances. Of another of our daily habits, it is wise to remember that coffee raises pressure more than tea, and China tea less than Indian.

There is no doubt that an indoor, sedentary life tends to high pressure far more than an active, outdoor one. This is partly due to the mental work and concentration that goes with it and partly to oxygen deficiency. The inhalation of oxygen lessens the viscosity of the blood and consequently the work of the heart and of the arterial muscles, while an excess of carbon-dioxide in the air increases the viscosity and the necessary heart force that must be expended. The amount of oxygen we inhale in the open is necessarily more than in confined buildings, and we all feel how difficult it is to drive our brains in a close, stuffy atmosphere. This points to the economic value of ventilation and space. Wise, moderate exercise also tends to lower pressure by

promoting a general quickening of circulation throughout the whole body; the stagnant pools are flushed out and oxygenation becomes more perfect. Even severe exercise in health only raises pressure temporarily; the subsequent level in health is below the original. But where there is evidence of cardiac and arterial disease, exercise must be taken wisely, moderately, and only slowly increased. This is done very effectually in some health resorts, where the patient is trained to mount gradually increasing slopes. The same effect is reached by graduated exercises. In all these methods pulse rate and arterial pressure are tested and serve as guides to further advance. Certain Bath treatments, such as Nauheim and its English adaptations, help materially to lower pressure and to hasten a sluggish blood flow. These act chiefly by dilating the blood-vessels at the surface of the whole body and thus relieving internal

congestions and increasing oxygen exchange.

The nature of our games and exercise in sclerosis needs careful thought. Golf, for instance, is very good if taken quietly, but some courses are so hilly that there is a good deal of strain put on the heart. If one is compelled to play on such a course, one must take it slowly, and not allow the spirit of the game to run away with one. Quiet sculling is one of the best exercises, for it works all the muscles of the body slowly and symmetrically, and the strain on heart and lungs is entirely under one's own control. Swimming, again, is a most healthy exercise, if taken quietly and not in very cold water. I know of nothing that improves one's wind so quickly. But all these exercises must be taken under advice and never pushed to the point of real fatigue or exhaustion.

The need of rest is as great as the need

of the right sort of exercise. Late hours should be absolutely avoided and little brain work should be done in the evening, so that the brain and all its important arteries can sink into relaxation and sleep at once. The rest to the heart and circulation is of course never so prolonged, but nature has designed them to get their rest only in moments. The heart in an adult rests more than thirteen hours out of the twenty-four, under quiet normal conditions, the time of rest being the diastole, and the time of work being the systole or contraction. There are few healthy men who could not walk a thousand miles in six weeks, walking about eight hours a day and resting for the remainder of their time; but there are not many men who could walk a thousand miles in a thousand consecutive hours, as the late Captain Barclay did, because the frequent interruptions to their sleep would exhaust them completely.

In the same way, if the heart is forced to beat more quickly, it becomes sooner exhausted, for the extra work is taken from the diastole, the sleeping or resting time of the heart.

The blood pressure is generally ten degrees lower in the morning after a good night's rest; and for this reason, in severe cases, I often advise people to take a whole day in bed once a week, so that this lower pressure may be prolonged for twenty-four hours.

The non-medicinal treatment of sclerosis, prophylactic and curative, consists then chiefly in a philosophical, calm mode of life, in a firm restraint of passions, of worry and excitements, in a wise and economic use of brain power, in great moderation in eating and drinking, in giving as much of our time as is possible to fresh air and moderate, unhurried exercise, and lastly to the avoidance of all severe strains on mind or body. Very

few of us are able to accomplish all these positive and negative virtues, but as far as in us lies, they should be our rule of life.

CHAPTER IV

THE MEDICINAL TREATMENT OF SCLEROSIS

CHAPTER IV

THE MEDICINAL TREATMENT OF SCLEROSIS

THE question now arises, what can the Physician, by real therapeutics, do to help? Much, I feel sure, if he will carefully and courageously apply the knowledge that has come to us of the late years. Firstly, Lauder Brunton showed us how we can quickly reduce the blood pressure that is one of the chief symptoms in angina pectoris, the immediate effect of amyl nitrite in reducing arterial tension, and the slower but very valuable effects of nitro-glycerin and the other nitrites. This has enabled us to meet many an

emergency, but the effects of these are not sustained enough to become a steady daily treatment. The orthodox remedy has been for years Iodide of Potassium; this has been by the teachers of the past so driven into us that, in spite of failures that far outweigh the successes, it has become heterodox to doubt it. Yet one must confess that one has been for years prescribing it more from a sense of duty than from any confident hope of its results. In a few cases, where there is cardiac pain and symptoms of new or chronic aortitis, it certainly does good, but in the average case of hyperpiesis it is a very poor reed to trust.

How does Iodide act? Chiefly, in all probability, by stimulating the thyroid to pour more of its secretion into the blood stream. Thus is produced the absorption of gummata, of new lowly formed tissues and the

thickenings of fibrositis and rheumatism. We see the same result more decidedly and more constantly in the treatment of myxœdema by thyroid feeding.

As I have shown before, senile degeneration, premature and normal, is largely due to general endocrine degeneration and deficiency, and it has many relations to myxœdema. Thyroid deficiency as a rule means raised blood pressure, and, as has been shown in young animals deprived of their thyroids, a strong tendency to get atheromatous disease of the large arteries, even in youth.

The parallels are many, and so are the lessons they convey. If one had a perfectly functioning thyroid in arteriosclerosis, one might with some confidence treat it by Iodides; but as we know that such is not the condition in the great majority of cases, we should expect

to fail. One would have to give Iodide in enormous quantities with any hope to whip up a senile thyroid into effectual activity, and then in all probability fail. (This may be the explanation of the miracles worked by big doses of Iodide in syphilitic gummata in the brain, but in these cases there is rarely evidence of thyroid deficiency.)

Why then do we take the long and disagreeable route to our object by giving Iodide? Thyroid feeding acts here just as it does in myxœdema. We have to take into consideration the comparative failure of the other endocrine glands, but that only adds to the charm and attractiveness of the problem. The suprarenal and the pituitary are the most important, but one must not neglect the sexual glands. I feel strongly that thyroid treatment alone or in combination is the rational method to adopt in sclerosis: personal

experience confirms this every day. We purposely side-track the worn-out thyroid of sclerosis and senility, and, by thyroid feeding, restore to a great extent the whole endocrine harmony, thus giving a new tone and stimulus to existence. We shall have to use more or less thyroid feeding for the remainder of life, but we must show our patients that it is not a medicine but a necessary food. As in myxœdema, so in sclerosis, thyroid feeding is the only means, as yet known, of producing absorption of those thickenings that characterize both diseases.

I have had lately the opportunity of watching and treating a thorough case of myxœdema in a lady about forty years of age, a very intelligent and educated woman. She weighs her symptoms and knows exactly when she needs more or less thyroid; she judges by her head feelings, vertigo, the

sense of fatigue, etc., and by her hair falling out. But thyroid in sufficient doses produces a quick, irritable heart action; this she can quiet by taking suprarenal extract. Under sufficient thyroid her blood pressure comes down to normal and the suprarenal does not raise it. With this balanced combination she can lead a useful and enjoyable life. The same thing happens more or less in later life, where there is high pressure and other signs of arterial thickening.

Suprarenal by the mouth seems to me to have the power of raising low pressures to the normal—a most valuable property in the asthenia of pneumonia and diphtheria—but there comes in some check action which prevents its causing hypertension.

Dr. Sajous, the well-known scientific physician of America, at the annual meeting of the American Therapeutic

Society in May 1920, said: " With regard to the adrenals, in his opinion, clinical experience with the human subject did not bear out the statements of physiologists that therapeutic doses of adrenalin had any inhibitory effects on the functions of the gastro-intestinal canal; in fact, the effect was quite the opposite. The supposed blood-pressure raising power of adrenalin also proved misleading; indeed, one of his workers found that, if there was one thing that adrenalin did not do, it was to raise blood pressure."

In this direction we must realize the wonderful selective action of adrenalin, that of dilating the coronary arteries, contracting the arteries and arterioles of the skin and of the great splanchnic area and of dilating the deep arteries of the limbs. These selective actions explain the great relief it gives in asthma and acute respiratory distress, such as

œdema of the lungs, where it bleeds a man into his own distal vessels.

The absence of raised pressure in the brachial and radial arteries may be thus explained also. Again we must not forget that there may be, and probably is, something in the extract of the whole gland besides adrenalin. Administered by stomach the extract has, I think, far more effect than pure adrenalin given in the same way, and more lasting. Given by rectum, adrenalin acts quickly and powerfully. In France thyroid treatment is sometimes carried out by injections of an extract of the whole gland subcutaneously, but it is difficult to get an extract that is stable.

In persons of middle age it is far more common to get the unpleasant heart effects of thyroid than in really old people, but it is not by any means an absolute rule. I know of two women well over ninety who cannot on this

account take thyroid by itself for long. After sixty, thyroid in combination with pitglandin (the dried extract of the pars-anterior of the hypophysis) becomes very useful. At this time of life the internal secretion of the sexual glands begins to fail, and pitglandin, I think, compensates for their deficiency. When one thinks of the extraordinary influence that the pars-anterior has in youth on growth, and non-growth, causing gigantism and infantilism, one cannot be surprised at its having some powerful influence at the other end of life. It can be given in large doses, 1 or 2 grains, and seems to have no poisonous effects. Unlike pituitrin (pars-posterior), it does not raise blood pressure, but, I believe, has the opposite effect. The secretions of testis and ovary are probably mild pressure raisers, and as they enter into the formation of nearly all the pluriglandular preparations that are on the

market, this should be recognized. What may be of great value in neurasthenia, where the pressure is generally sub-normal, may be harmful in sclerosis. Most of these preparations contain also whole pituitary, and this again is harmful in plus pressure. It always strikes me as unscientific to give whole pituitary in any case, for the two parts are largely antagonistic in their action. The extracts of the sexual glands have been given, with the object of restoring sexual power (except for its side effects a thing of doubtful value), but if they prove to be pressure raisers, sclerosis will do better without them. In all probability pitglandin has a stimulating effect on the gonads, as it has on sexual development in childhood, but it does not raise pressure.

We must regard it as a clinical fact that the thyroid reduces pressure. The original experiments of Oliver and

Schäfer seem conclusive. Brunton said: "Thyroid gland, when taken by the mouth, dilates the peripheral vessels, making the skin warm and moist, and quickens the pulse. In this respect it antagonizes the suprarenal secretion. Besides this effect on blood pressure, it has other effects on metabolism which are important." Biedl says: "If thyroid or iodothyrin be given continuously for two or three weeks, the amount of CO$_2$-excretion will be increased by 15 to 16 per cent. The nitrogenous interchanges are invariably disturbed by thyroid; the increased decomposition of albumen is expressed by an increased excretion of nitrogen. Thyroidism also brings about a considerable increase in the amount of calcium excreted in the fæces, the calcium carrying off with it a large proportion of phosphorus." This phosphorus loss may explain some of the feeling of weakness and exhaus-

tion that thyroid feeding often causes; this a good phosphate food such as Bynogen will help to remove.

It is thus evident that we have in thyroid medication something much more than a mere tension depressor. Its other properties, influencing excretion, explain to some extent its sphere of usefulness and its drawbacks. The increased excretion of calcium may be very beneficial in atheroma, but is probably not an advantage in other ways. An observant man, who did not need it, was taking thyroid rather freely; he cut his finger and could not get it to heal. Thinking that this might be the result of calcium loss, he stopped the thyroid, and his wound healed, as he said, in a few hours. To the increased general metabolism that thyroid produces is due its striking effects in myxœdema: the new tissues, abnormal in quantity if not in essence, are absorbed,

and the face and limbs resume their natural appearance. Senility and myxœdema are so closely related that one would naturally expect the same results to ensue. A fair steady trial will prove that such is the case, but all such clinical experiments need to be carried out in each individual case with thoroughness, faith and intelligent observation. Failure may at first be the verdict, but it is in most cases due to some defect in method. A thoughtful review of our physiological knowledge of endocrine actions will often show where lies the fault. A carping critic may say, What is your physiological knowledge of the action of these glands? And one must humbly answer, Not very much. But we are going to find our way through the twilight of our ignorance, partly by physiological experiment, but chiefly by clinical results. We must also be encouraged by the thought that all these

clinical trials are without risk. What matters it if we produce temporary symptoms of hyperthyroidism? We can always correct them or retrace our steps. Russell Lowell's proverb was, "A man who never makes a mistake never makes anything." In such therapeutics we shall discover the pathways of natural curative medicine. It is not the introduction into human bodies of vegetable and mineral remedies or poisons; it is simply the introduction of correlated gland extracts from other mammals. As far as we know, the glands of the herbivora answer as well as the glands of the omnivora, but we may have to correct this view.

In treating hyperpiesis, we shall come across some cases that seem to yield to thyroid treatment hardly at all, and here the trouble is often found to be chiefly, if not entirely, in intestinal absorption of deleterious products of

faulty digestion ; there may or may not be signs of colitis ; but, as I have said before, duodenal extract freely given alters the condition rapidly in most cases. In these cases probably the absorption of these residues of defective digestion produces hyperadrenia, and the adrenal-thyroid balance is disturbed. Dr. Sajous (in his paper previously mentioned) claims that calomel in very small doses, not exceeding gr. $\frac{1}{12}$, is a powerful activator of the thyroid secretion ; he claims that so given it has been effective in checking epidemics of diphtheria. It probably acts partly as an intestinal bactericide and partly by its action on the thyroid, increasing the defensive anti-bodies in the blood.

There is one other medicine that has a very decided action on some forms of raised pressure, and that is hippuric acid. This again is a natural or endogenous cure. It was introduced by the

late Dr. George Oliver of Harrogate, and is chiefly used as sodium or lithium hippurate. For some time before his death Dr. Oliver was seeking for a reasonable explanation of its action, but his death unfortunately came before he had carried this through. I can give no theory, but of its effects in many cases I feel convinced, though I cannot say beforehand in which class of case it will answer. In the pre-sclerotic cases of middle life it often acts quickly and well, even better than thyroid. Again, in old age, in cases where one would expect thyroid to give the better results, it answers equally well.

Two of my patients—old ladies well over seventy—have had hyperpiesis for twelve years or more; they were condemned by good men many years ago. They have lived on hippurate almost without breaks all these years, and it has kept their pressure down to a rea-

sonable working-point. With both I have tried thyroid treatment with very slight success; they always come back to their hippurate as the well-tried friend. I have another patient aged ninety-four, who has had periods of high pressure for twenty years, and if she misses her daily dose the pressure goes up and her head gets giddy and confused. It is a very wholesome medicine, causes no gastric disturbance, and is easily soluble; from 5 to 15 grains a day are generally needed. If there are gouty symptoms I give the lithia salt; if not, the sodium. The benzoates have, I believe, much the same action, but they are not easily digested and large doses are required. In bad and obstinate cases the hippurate and thyroid treatment sometimes act well together.

I have written now all that I know from personal experience about the treatment of this complicated condition

we call arterio-sclerosis; and many of the symptoms and much of the treatment I have been able to watch and verify for myself by almost hourly contact with it. Nevertheless, this treatment will have to stand the racket and assaults of both friendly and hostile critics, and so it should be. In the practice of medicine we must be prepared to maintain our position and to give a reason for the faith that is in us, for the issues are so great and affect others rather than ourselves.

I have said that this is somewhat of an occupation disease: it is a vicious circle, not originating necessarily in any vice, but in the pressure of life and the stress of circumstances. The causes often we cannot remove entirely, but only modify, and so we are compelled to treat symptoms only; our ambition and longing will be to do much more than this—to bring about a perfect reform; but

in the management of this, as in most morbid conditions, compromise, with as much true wisdom as we can squeeze into it, is the only practical policy. Our endeavour must be to break the vicious circle whenever and wherever we can. The lowering of pressure does not sound a great thing in itself, but it immediately lessens the work of the heart, sets more free the circulation of blood in the brain, often restores the power of sleep and so ensures comparative rest all round. It thus gives us a breathing space in which we can consider and attack the origins of evil.

In conclusion I ask my readers to consider well Sir Clifford Allbutt's most wise words on this question: "In entering upon the discussion of vaso-dilatation, as contrasted with agents which bring about this change indirectly by modifying the causes of morbid constriction, we have to consider how

far mere dilatation—brought about, that is to say, immediately and singly—serves any good purpose.

"We are told that to act thus directly upon the vessels is but to treat a symptom, and is therefore absurd. But whatsoever be our judgment on this or any such particular effect, the common denunciation of treating symptoms, which sounds very philosophical, is surely but a parrot phrase. Why should we not treat a symptom? If in granular kidney by mere pressure reduction the grievous headache be abated, or in angina pectoris the pain be thus charmed away, we have so far at any rate a substantial gain.

"In renal diseases it is generally agreed that, on the whole, with due caution, to lower pressure is helpful. Moreover, if by mitigation of his suffering the patient gets a chance of picking up in many other ways, are we not more than

justified in our interference, narrow as it may seem? We never know what interference may cut a link in a vicious circle. If we cannot stop the crack in the water-pipe, we need not throw away the mop.

"The warning should run not against the treatment of a 'mere symptom,' but lest, while giving our attention to the symptom and snatching at an immediate advantage, we lose our grip of the case as a whole."

In whatever treatment we adopt for sclerosis, we must bear in mind that, under the raised pressure, the heart is very apt to dilate. To lower pressure alone in this condition often ends in failure. We must brace up the heart at the same time as we lower resistance. For the purpose strophanthus in large doses and strychnia are the best drugs. Digitalis is occasionally necessary, but more often does harm than good. Given,

however, in this well-tried old form it contracts the ventricle without raising pressure:

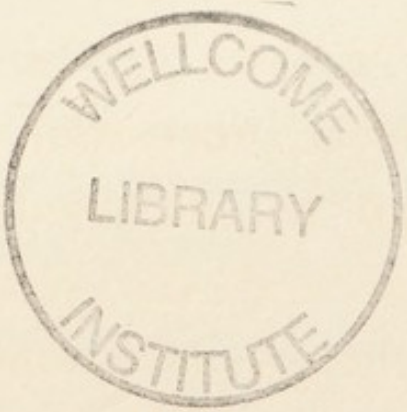
℞ Pulv. Digitalis .. .. gr. 1–2
Pil. Hydrarg. .. .. gr. 1
Pil. Scillæ Co. .. .. gr. 1½
Ft. pil. to be taken twice a day.

The compound gland tablet that I chiefly use has this formula:

℞ Thyroid Extract dried .. gr. ½
Orchitic Extract dried .. gr. ⅓
Ovarian Extract dried .. gr. ⅓
Anterior Pituitary dried .. gr. ½
Ft. tab. 1.

This can be taken three times daily and acts best, I think, if taken before food. The amount of thyroid can be doubled if necessary. In cases where there is much prostration the anterior pituitary can be increased to 2 grains. The orchitic and the ovarian can be omitted if thought advisable.

Hitherto many of us have looked on this condition, arterio-sclerosis, as a tenant's fixture, to be got rid of only when he moves into his next habitation. This is neither fair to ourselves nor to our patients. It is a hopeless stultification of our more recent physiological knowledge and discoveries. It is a pessimistic faith that deserves failure and gets it. It is a silent denial of those healing powers which Christ so lovingly displayed when on earth, and which are still the heritage of those who can see and believe.



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